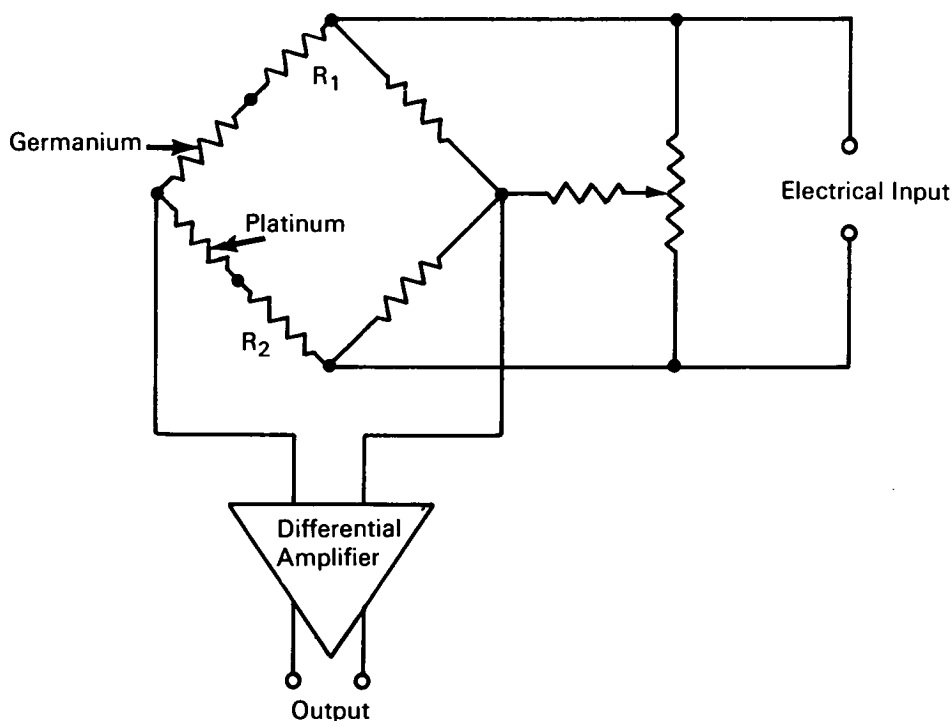


NASA TECH BRIEF



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Resistance Thermometer Has Linear Resistance-Temperature Coefficient at Low Temperatures



The problem:

To devise a resistance thermometer that will have a linear temperature-resistance coefficient over a range from approximately -140°C to approximately -253°C . At the lower end of this range, the resistance-temperature curve of the standard platinum resistance thermometer is nonlinear.

The solution:

A resistance thermometer incorporating a germanium resistance element (which has a negative temperature coefficient) with a platinum resistance element in a Wheatstone bridge circuit.

How it's done:

The platinum and germanium resistors are connected as adjacent legs in the Wheatstone bridge. Resistors R_1 and R_2 may be placed in series with the platinum and germanium resistors for balancing purposes. As the temperature varies, the resistances of the two legs vary in opposite directions so that the nonlinearities of their respective resistance vs temperature curves effectively cancel. As a consequence, an essentially linear output (which is a measure of the temperature) is obtained from the differential amplifier over the indicated temperature range.

(continued overleaf)

Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Western Support Office
150 Pico Boulevard
Santa Monica, California 90406
Reference: B66-10612

Patent status:

No patent action is contemplated by NASA.

Source: W. Kuzyk
of General Dynamics
under contract to
Western Support Office
(WOO-190)